2 Nov

Space Technology

Delay in Kennedy Landing Proposed

By Craig Covault

Washington—Space shuttle's first use of the Kennedy Space Center runway as a landing site would be delayed until at least Mission 5 and possibly longer under a Johnson Space Center proposal that seeks to extend the use of Edwards AFB, Calif., until all orbiter landing capabilities are demonstrated fully.

Although the vehicle's performance on its second flight will be an important factor in deciding whether to delay Kennedy landings until at least Mission 5, some Johnson officials believe landings at Kennedy should be delayed until Mission 5 in any case. Earlier this summer, Johnson had planned the fourth flight as the first Kennedy landing.

Johnson's Flight Operations Div. has not yet determined whether Mission 5 in late 1982 should also be planned as an Edwards landing, although this has been discussed in the context of maintaining conservatism in early flight phases of the program. Another consideration will be whether or not the new orbiter, 099 Challenger, should be landed on the Kennedy runway during its first mission, either the fifth or sixth shuttle flight. Some astronauts believe a Kennedy landing should not be attempted on Challenger's first flight, although not all shuttle managers agree.

The choice of landing site is one of several issues being addressed as the second flight approaches. Another flight safety proposal already adopted increases the emphasis on three-man versus two-man shuttle cockpits. Workload of the shuttle commander and pilot, especially during launch or reentry emergencies, has been determined to be high enough to require a third crewman in such circumstances. Therefore, planning has changed to permit three crewmen in Columbia's cockpit on Mission 5 if Columbia is retained as the orbiter on that flight. Earlier plans placed half of the four-man crew for Mission 5 in Columbia's middeck during launch and reentry.

Whether the National Aeronautics and Space Administration will use the orbiter Columbia or the new orbiter 099 for the first operational flight planned next October is linked to timing. A cumulative slip of only six weeks between Missions 2 and 4 would make use of the new orbiter for Mission 5 a strong possibility. This could influence the Mission 5 landing decision as well as other shuttle activities in the Mission 4 through 6 period.

If current schedules hold, however, and Columbia is used as planned on the fifth mission, it will need to be modified to

Soviet Booster Advance Believed To Exceed Saturn 5 Capability

Washington—Saturn 5-class booster under development by the Soviet Union is estimated by the Defense Dept. to have an actual payload-to-orbit target of 390,000-455,000 lb., which is substantially greater than the 280,000-lb. orbital capability of the U. S. Saturn 5 used in the Apollo and Skylab programs.

The data are included in Defense Secretary Caspar W. Weinberger's report on Soviet military power, which said the new vehicle could launch extremely large laser weapons and heavy Soviet space stations.

This Soviet heavy space launch capability will far exceed the heavy space launch capability of the U. S. well into the 1990s, a factor that concerns the Defense Dept. because the Soviets already launch 10 times the payload weight into orbit each year that the U. S. does.

The Soviet Union is providing its space program an 8% annual growth rate that allows it to launch 660,000 lb. of payload into orbit annually, the Weinberger report said. "Some, but by no means all of this differential" can be countered by the higher technology and longer life of U. S. spacecraft, the report said, expressing concern over the proliferation of Soviet space systems.

Weinberger's data reinforces an earlier AVIATION WEEK & SPACE TECHNOLOGY report that the Soviets have renewed development of a Saturn 5-class booster for launch of a 220,000-lb.-class military/scientific space station, which will be manned permanently by about 12 cosmonauts (AW&ST June 16, 1980, p. 26). The increased payload-to-orbit data indicate the station design could be even heavier than that earlier believed.

"A very large booster is under development and will have the capability to launch very heavy payloads into orbit, including even larger and more capable laser weapons. This booster is estimated to have six-to-seven times the launch weight capability of the space shuttle," the Defense Dept. report said. "The new booster will be capable of putting very large permanently manned space stations into orbit." Military research and development is conducted on board Salyut space stations, the Defense report said.

AVIATION WEEK & SPACE TECHNOLOGY reported earlier that the first test of the new vehicle could occur by 1983, with launch of the permanently manned space station on the booster by as early as 1985.

"The Soviet goal of having continuously manned space stations may support both defensive and offensive weapons in space with man in the space station for target selection, repairs and adjustments and positive command and control," Weinberger's report said.

In addition to the heavy weapons and space station uses cited by the Defense Dept. report, the new heavy launcher will provide the Soviet Union with a solid base from which to mount the first manned space flights to Mars and initial Soviet manned lunar flights.

The Soviet and U. S. launch rates between Aug. 18 and Oct. 8 illustrate the magnitude of the Soviet effort. During this period the Soviets launched four other spacecraft carrying out non-military missions while the U. S. launched two non-military missions.

The Soviet Union also is continuing development of a manned winged reusable space transport (AW&ST Nov. 6, p. 19; Mar. 20, 1978, p. 14).

Although the report on Soviet military power did not discuss the winged spacecraft, it did state that "Soviet space research and development, test, production and launch facilities are all undergoing a continuing buildup.

"The Soviets appear to be interested in and possibly [are] developing an improved antisatellite weapon.

"It is anticipated the Soviets will continue to work in this area with a goal of negating satellites in high orbit, as well as developing more effective kill mechanisms, perhaps using laser or some other type of directed-energy weapons," the report said.

A laser weapons spacecraft is under development in the USSR and is expected to be launched soon (AW&ST Oct. 5, p. 17). In addition to this new high technology spacecraft, the Soviets also have begun utilization of a new advanced imaging reconnaissance spacecraft using digital image transmission instead of relying on reentry vehicles for return of intelligence photographs to Earth.

Data on the KH-11 design was provided to

have a dual satellite payload. Conservative planning for the first landing at Kennedy has the support of Johnson director Christopher C. Kraft, Jr. "I share the concern that we understand the flying qualities of this vehicle before we broach any white scarf approach to landing at Kennedy," Kraft said.

Flight Operations Div. is basing its decision on the amount of orbital flight test experience it believes will be necessary to demonstrate key orbiter capabilities necessary for approaches to Kennedy's concrete runway. These are:

■ **Crosswind landings**—At least two crosswind landings at Edwards are desired before flying the orbiter onto a concrete runway. An objective of the second space shuttle mission is to make a crosswind landing if possible, but statistically the chances are slim that crosswinds will occur early in the morning this time of year at Edwards. Kraft stressed he believes crosswinds will present no orbiter problems once demonstrated.

■ **Full autoland demonstrations**—Mission 2 will fly a partial autoland profile that will be transitioned to full manual control just before the preflare maneuver at 1,750 ft. On Missions 3, 4 and 5 full autoland demonstrations are planned with the automatic system handling orbiter control through rollout.

■ **Optional targeting**—A new software capability, designated optional terminal area energy management targeting, will be available starting on Mission 5 and will allow greater capability for the orbiter's automatic system to adjust for variables in orbiter energy at the end of the reentry. The greater ability to adjust will not only enhance control in abnormal energy situations but greatly assist in avoiding weather such as the large cloud buildups or thundershowers that are frequent in central and coastal Florida.

Astronauts would like to demonstrate the optional targeting capability on approach to Edwards before flying into Kennedy where it could be more of a necessity than a demonstration.

With the optional targeting capability, an orbiter can carry excess energy into the landing site area and then be insured the automatic system will compensate by commanding a descending turn so the runway is reached with the proper amount of airspeed and altitude on final approach. If an orbiter arrives with too little energy, the automatic system will be better able to turn and adjust the spacecraft's flightpath to reach the runway properly, if at all possible.

While the conservative approach would be to slip Kennedy landings until all these demonstrations are completed at Edwards, other considerations, such as possible high capability demonstrated on the second and third missions coupled with turnaround requirements, could prompt landing at Kennedy as early as Missions 4 or 5, some managers believe.

The orbiter Columbia is scheduled to return to Rockwell's Palmdale, Calif., facility for several months of modifications in late 1982. Shuttle managers earlier believe it would be best to land the spacecraft at Edwards prior to modification so it could be towed to Palmdale. A Kennedy landing would require ferrying the orbiter by Boeing 747 back to Edwards.

Kennedy Space Center, however, has recommended a Kennedy landing before the modification because Edwards has far less capability to drain the hypergolic propellants from the orbiter's orbital maneuvering and reaction control systems. Since Kennedy personnel manage orbiter servicing at Edwards, Kennedy engineers rea-

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the USSR by convicted spy William Kampiles (AW&ST Nov. 27, 1978, p. 21), and the data could have aided the Soviets in the design of their new digital reconnaissance vehicle.

A U. S. KH-11-type spacecraft was launched from Vandenberg AFB, Calif., on Sept. 3.

Of the 14 Soviet military spacecraft launched between late August and early October, six have been imaging reconnaissance vehicles, two were ocean surveillance spacecraft and three were navigation spacecraft.

One Soviet mission ended in failure when the booster launching a Molniya spacecraft had an upper-stage underburn, which placed the spacecraft in the wrong orbit. A spacecraft with military weather satellite characteristics and another satellite with the characteristics of a vehicle type believed used in calibrating antisatellite systems also were launched.

The individual Soviet spacecraft involved in these missions are:

■ **Cosmos 1,297**—The reconnaissance satellite was launched Aug. 18 into a 389 × 209 km. (241 × 130-mi.) orbit inclined 72.9 deg.

■ **Cosmos 1,298**—This reconnaissance mission was launched Aug. 21 into a 351 × 179-km. (218 × 111-mi.) orbit inclined 64.9 deg.

■ **Cosmos 1,299**—This ocean surveillance spacecraft is a type that carries a nuclear reactor for power. When the mission is terminated, the reactor is boosted to a higher orbit for safety, a measure that failed when one of the spacecraft scattered radioactive debris over Canada (AW&ST Jan. 30, 1978, p. 33). In the case of Cosmos 1,299, the spacecraft was launched Aug. 25 into a 281 × 250-km. (174 × 155-mi.) orbit inclined 65 deg. After only 12 days of operations, its reactor section was boosted to a 955 × 910-km. (593 × 565-mi.) orbit where the nuclear powerplant would be safe. The termination of the operational low-altitude mission normally does not take place for several weeks.

■ **Cosmos 1,300**—This spacecraft has characteristics of a military weather satellite and was launched Aug. 25 into a 675 × 648-km. (419 × 402-mi.) orbit inclined 82.5 deg.

■ **Cosmos 1,301**—This film-return earth resources spacecraft, which provides data to the Soviet Priorda earth resources center, was launched Aug. 27 into a 300 × 224-km. (186 × 139-mi.) orbit inclined 82.3 deg.

■ **Cosmos 1,302**—This store-dump communications spacecraft was launched Aug. 28 into an 824 × 783-km. (512 × 487-mi.) orbit inclined 74 deg.

■ **Cosmos 1,303**—The reconnaissance spacecraft was launched Sept. 4 into a 398 × 216-km. (247 × 134-mi.) orbit inclined 70.4 deg.

■ **Cosmos 1,304**—This navigation satellite was launched Sept. 4 into a 984 × 917-km. (611 × 570-mi.) orbit inclined 83 deg.

■ **Cosmos 1,305**—The Soviets designated their failed Molniya a Cosmos after the booster malfunction Sept. 11 that placed the communications spacecraft into an improper 13,870 × 648-km. (8,618 × 402-mi.) orbit inclined 63 deg.

■ **Cosmos 1,306**—This conventionally powered ocean surveillance spacecraft was launched Sept. 15 into a low orbit and then maneuvered into its operational 458 × 408-km. (285 × 254-mi.) orbit inclined 65 deg.

■ **Cosmos 1,307**—This reconnaissance spacecraft was launched Sept. 15 into a 418 × 209-km. (260 × 130-mi.) orbit inclined 72.9 deg.

■ **Cosmos 1,308**—This navigation satellite was launched Sept. 18 into a 1,107 × 979-km. (632 × 608-mi.) orbit inclined 82.9 deg.

■ **Cosmos 1,309**—The earth resources film-return spacecraft was launched Sept. 18 into a 282 × 225-km. (175 × 140-mi.) orbit inclined 82.3 deg.

■ **Arcad 3**—The Soviets launched this joint Soviet/French scientific spacecraft Sept. 21 into a 1,920 × 380-km. (1,192 × 236-mi.) orbit inclined 82.6 deg. (AW&ST Oct. 12, p. 87).

■ **Cosmos 1,310**—The vehicle has characteristics of satellites used to help perfect the Soviet antisatellite system. The spacecraft was launched Sept. 23 into a 525 × 478-km. (326 × 297-mi.) orbit inclined 65.9 deg.

■ **Cosmos 1,311**—The spacecraft was launched Sept. 28 into a 521 × 470-km. (324 × 292-mi.) orbit with an 83-deg. inclination. Its mission is unknown.

■ **Cosmos 1,312**—Launched Sept. 30, this navigation spacecraft was placed into a 1,530 × 1,495-km. (951 × 929-mi.) orbit inclined 82.6 deg.

■ **Cosmos 1,313**—Launched Oct. 1, the reconnaissance spacecraft was placed into a 314 × 214-km. (195 × 133-mi.) orbit inclined 70.4 deg.